

$$x^2 = y + 0 \quad x = \pm \sqrt{y+0} \quad y+0 \geq 0 \quad \Rightarrow R_f = [-0, +\infty) \quad \text{(الف)}$$

$$x^2 = y - 1 \quad x = \pm \sqrt{y-1} \quad R_f = \mathbb{R} \quad \text{(ب)}$$

$$y = x^2 - 4x + 4 + 2 = (x-2)^2 + 2 \quad x = \pm \sqrt{y-2} + 2 \quad y-2 \geq 0 \quad \Rightarrow R_f = [2, +\infty) \quad \text{(الف)}$$

$$y = x^2 - 5x + 1$$

$$y + 0,20 = x^2 - 5x + 1 + 0,10 \Rightarrow y + 0,10 = (x-2,5)^2 \Rightarrow x-2,5 = \pm \sqrt{y+0,10} \Rightarrow x = \pm \sqrt{y+0,10} + 2,5$$

$$y+0,10 \geq 0 \quad y \geq -0,10 \quad R_f = [-0,10, +\infty) \quad \text{(ب)}$$

$$x^2 - 2x = x^2 + 3 \quad x(x-1) = 2x+3 \quad x = \frac{2x+3}{x-1} \quad \frac{\frac{2}{x} + \frac{3}{x-1}}{\frac{1}{x} - \frac{1}{x-1}} = \frac{2(x-1) + 3x}{x-1-x} = \frac{5x-2}{-1} = 2-5x$$

$$x = \pm \sqrt{\frac{2x+3}{x-1}} \quad \Rightarrow R_f = (-\infty, -\frac{3}{2}] \cup (\frac{1}{2}, +\infty) \quad \text{(الف)}$$

$$|x|y - 4y = 2|x| + 1 \quad |x|(y-2) = 4y+1 \quad |x| = \frac{4y+1}{y-2} \quad \frac{\frac{4}{y} + \frac{1}{y-2}}{\frac{1}{y} - \frac{2}{y-2}} = \frac{4(y-2) + (y-2)}{y-2-2y} = \frac{5y-10}{-y-2} = \frac{10-5y}{y+2}$$

$$R_f = (-\infty, \frac{1}{2}] \cup (\frac{2}{5}, +\infty) \quad \text{(الف)}$$

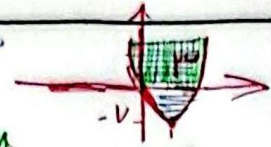
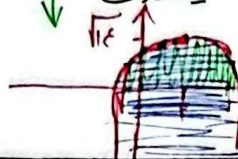
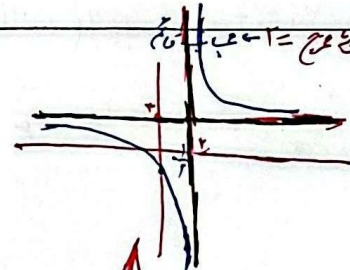
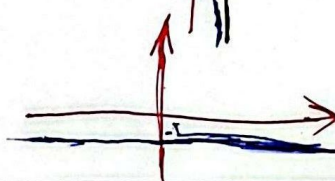
$$y = \frac{1}{x^2 - 4x} \Rightarrow x^2 - 4x = \frac{1}{y} \Rightarrow x^2 - 4x + 4 = \frac{1}{y} + 4$$

$$(x-2)^2 = \frac{1}{y} + 4 \quad x-2 = \pm \sqrt{\frac{1}{y} + 4} \quad x = \pm \sqrt{\frac{1}{y} + 4} + 2 \rightarrow \frac{1}{y} + 4 \geq 0 \Rightarrow \frac{1+4y}{y} \geq 0$$

$$R_f = (-\infty, -\frac{1}{4}] \cup (0, +\infty) \quad \text{(الف)}$$

$$\text{ext} \mid \frac{b}{4a} = \frac{-7}{-1} = 7 \quad \text{Min} \mid -7 \quad \Rightarrow R_f = [-7, +\infty) \quad \text{(الف)}$$

$$\text{ext} \mid \frac{b}{4a} = \frac{-\frac{4}{3}}{-1} = \frac{4}{3} \quad \text{Max} \mid \frac{4}{3} \quad \Rightarrow R_f = (-\infty, \frac{4}{3}] \quad \text{(ب)}$$

$y = \sqrt{x^2 - 6x + 2}$ $\text{ext} \begin{cases} \text{Max} \\ \text{Min} \end{cases} \left \begin{array}{l} \frac{-b}{2a} = 3 \\ -7 \end{array} \right.$		الف) $R_f = [0, +\infty)$	6
$y = \sqrt{-x^2 + 6x + 1}$ $\text{ext} \begin{cases} \text{Max} \\ \text{Min} \end{cases} \left \begin{array}{l} \frac{-b}{2a} = 3 \\ \sqrt{10} \end{array} \right.$		الف) $R_f = [0, \sqrt{10}]$	7
$y = \sqrt{x^4 + 6x^2 + 2x + 1}$ $R_f = \mathbb{R} - \mathbb{R}^- = [0, +\infty)$	$y = x^4 + 2x^2 + 2x + 1$	الف) $R_f = \mathbb{R}$	8
$y = \frac{2x+1}{x-2}$ $R_f = \mathbb{R} - \{2\}$	$R_f = \mathbb{R} - \{2\}$	الف) $R_f = \mathbb{R} - \{2\}$	9
$y = \sqrt{\frac{4x+1}{x+3}}$	$R_f = \mathbb{R} - \sqrt{\frac{4}{1}} = \mathbb{R} - \{2\}$	الف) $R_f = \mathbb{R} - \{2\}$	10
$y = \frac{3x+1}{x-2}$ $\frac{dy}{dx} = 3$ $\frac{dy}{dx} = -\frac{1}{x-2}$		الف) $R_f = \mathbb{R} - \{2\}$	11
$y = \frac{4x-2}{1-2x} = \frac{4x-2}{-(2x-1)} = -2$		الف) $R_f = \mathbb{R}$	12
$y = \cos^2 x + \frac{1}{\cos^2 x}$ $\Rightarrow R_f = (-\infty, 2] \cup [2, +\infty)$ $R_f = [2, +\infty)$	$\Rightarrow R_f = (-\infty, 2] \cup [2, +\infty)$ $R_f = [2, +\infty)$	الف) $R_f = [2, +\infty)$	13
$y = \sqrt{\frac{x+1}{x}} = \sqrt{x + \frac{1}{x}}$	$\Rightarrow R_f = (-\infty, \sqrt{2}] \cup [\sqrt{2}, +\infty)$	الف) $R_f = (-\infty, \sqrt{2}] \cup [\sqrt{2}, +\infty)$	14